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IMPLEMENTATION PLAN REVIEW FOR MONTANA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

TRW/Environmental Services

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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FOR
MONTANA
REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

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Denver, Colorado 80203

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U. S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
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1.0 EXECUTIVE SUMMARY

The enclosed report is the U. S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plans.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIPs, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have revised or are currently in the process of revising SO_2 regulations. These states are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are: (1) the use of the example region approach in developing statewide air quality control strategies; (2) the existence of State Air Quality Standards which are more stringent than NAAQS; and (3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIPs were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCRs of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring one percent sulfur oil to be burned statewide where the use of a three percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based in the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality standards. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution problems such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources often constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCRs. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, and E. A map showing Montana and its AQCRs is shown on the following page.

FINDINGS

- The Montana Implementation Plan has been reviewed for the most frequent causes of over-restrictive emission limiting regulations. Although a statewide approach was used in developing control strategies for TSP, and Montana has slightly more stringent air quality standards than the NAAQS, there are no indications that current TSP regulations are overly restrictive in the context of Section IV of ESECA.

- There are indications of generally widespread TSP problems in the State, with NAAQS TSP violations occurring in all AQCRs except Great Falls. Since the State's fuel combustion sources are generally operating well within the State's TSP emission regulations, increases in particulate emissions could occur without relaxation of the existing regulation. Any increase in particulate emission levels would tend to aggravate the current TSP situation. Therefore, Montana's particulate emission regulation for fuel burning sources is not a good candidate for revision.

- There are tolerances for increased SO_2 emissions in the Great Falls and Miles City AQCRs. The State's fuel combustion sources are generally in compliance with the State's SO_2 emission regulation. Thus, there are indications that this regulation may be overly restrictive in these two AQCRs.

- The Helena AQCR contains three counties with AQMA designations for SO_2, and this AQCR also exhibits NAAQS violations for this pollutant. Therefore, it has no tolerance for increased SO_2 emissions and should not be a candidate for regulation relaxation. For the remaining two AQCRs (Billings and Missoula), there is insufficient SO_2 air quality data to determine whether they have a tolerance for emissions increase.

- Little clean fuel savings are possible from Montana power plants since coal is the predominant fuel used in these facilities. Natural gas is the main fuel used by the State's major industrial fuel burning sources, but the feasibility of these facilities switching to other (dirtier) fuels is unknown.

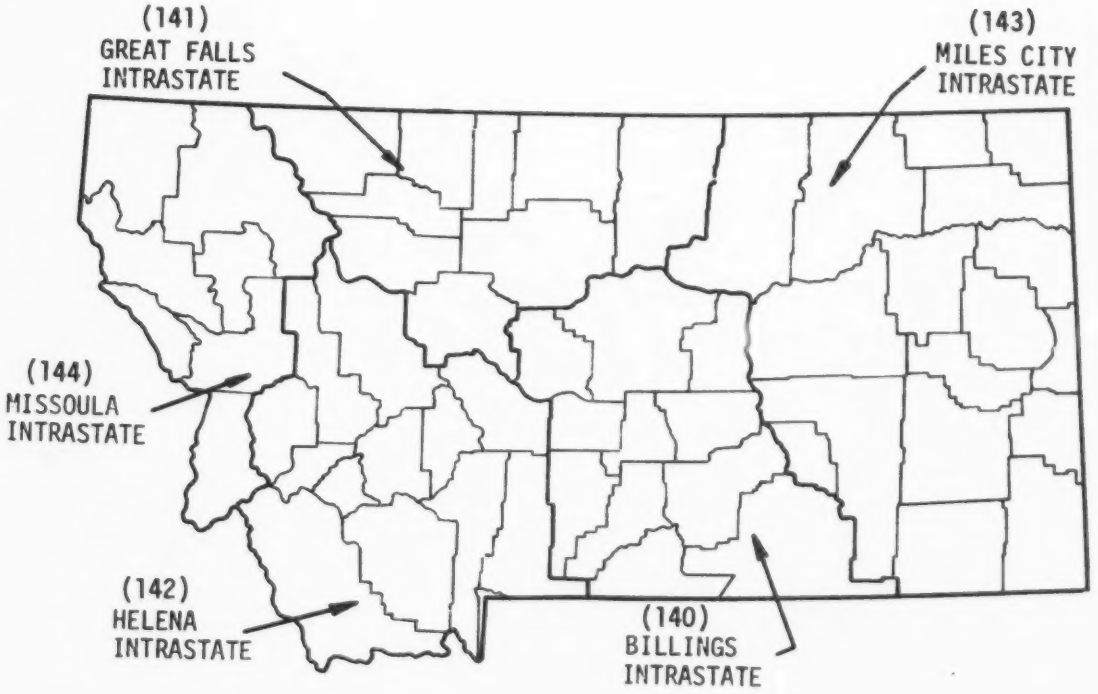

Figure 1. Air Quality Control Regions in Montana

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the SIP have emission limiting regulations for control of existing (1) power plants, (2) industrial sources, and (3) area sources.
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State not initiated action to modify combustion sources emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on reported (1973) Air Quality Data, does air quality meet NAAQS?
- Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources lower than those of other sources?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?
- Must emission regulations be revised to accomplish significant fuel switching?
- Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?
- Is there a significant Clean Fuels Saving potential in the region?

The following portion of this report is directed at answering these questions.

The initial part of the SIP Review Report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulation. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendices C, D and E.

Based on an overall evaluation of EPA's current information, AQCRs have been classified as "good," "marginal," or "poor" candidates for regulations revisions. These ratings, which are shown in the Summary Table on Page 9 were determined by assessing the following criteria:

Good	Poor	Marginal
1) Adequate number of air monitoring sites	1) Violation of NAAQS	1) No air quality data or insufficient number of monitoring sites
2) No NAAQS violations	2) Attainment date for NAAQS later than 1975	2) Inconsistent "indicators"
3) Attainment date of 1975 for NAAQS in the SIP	3) Proposed AQMA	
4) No proposed AQMAs	4) Modeling results show no potential for regulation revision	
5) Modeling results show a potential for revision		

For an AQCR to be rated as a good candidate, all of the criteria listed under "Good" would have to be satisfied. The overriding factor in rating an AQCR as a poor candidate is a violation of either the primary or secondary National Ambient Air Quality Standards during 1973. However, if any of the

other conditions listed under "Poor" exists, the AQCR would still receive that rating. The predominant reason for a marginal rating is a lack of sufficient air quality data. Marginal ratings are also given when there are varying or inconsistent "indicators."

After a candidacy has been given to a region, a follow-up analysis should be conducted depending on the rating. A region that has been indicated to be a good candidate for regulation revision should be examined in more detail by the state and the regional office of the EPA, including an examination of current air quality, emissions, and fuel use data, with which the state has more familiarity. If the state feels that clean fuels could be saved in a region rated marginal, then an analysis of air quality data that may have become available since this report should be examined. If current data do not indicate a potential for regulation revision then further study would not be warranted. An AQCR that has been indicated to be a poor candidate would not warrant further study unless the state feels that new information has become available indicating that the poor rating is no longer valid.

STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY TABLE)

"INDICATORS"	STATE		(140) Billings AQCR		(141) Great Falls AQCR		(142) Helena AQCR		(143) Miles City AQCR		(144) Missoula AQCR	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	Yes											
• Does the State have emission limiting regulations for control of:												
1. Power plants	Yes	Yes										
2. Industrial sources	Yes	Yes										
3. Area sources	Yes	No										
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	No	No										
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	Yes	Yes										
• Are there Air Quality Maintenance Areas?			Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	No	No	No	No	Yes	Yes	No	Yes	No
• Is there an expected 1975 attainment date for NAAQS?			Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
• Based on reported (1973) Air Quality Data, does air quality meet NAAQS?			No	a	Yes	Yes	No	No	No	Yes	No	a
• Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	a	Yes	Yes	No	No	No	Yes	No	a
• Are the total emissions from stationary fuel combustion sources lower than those of other sources?			Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?			b	No	b	No	b	No	b	No	b	No
• Must emission regulations be revised to accomplish significant fuel switching? [c]			No	No	No	No	No	No	No	No	No	No
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			Poor	Marginal	Marginal	Good	Poor	Poor	Poor	Good	Poor	Marginal
• Is there a significant Clean Fuels Saving potential in the region?			No	No	No	Yes	No	No	No	No	No	No

[a] No data available.

[b] No modeling data available for this AQCR.

[c] While some of Montana's major fuel combustion sources are violating the applicable State emission regulations, most sources are in compliance. Therefore, for many sources, emissions could be increased without relaxing the existing regulations.

2.2 AIR QUALITY SETTING FOR THE STATE OF MONTANA

The State of Montana is one of four states in EPA Region VIII. (The other states are Colorado, Utah and Wyoming.) Montana is divided into five AQCRs. These are listed below:

140 - Billings Intrastate
141 - Great Falls Intrastate
142 - Helena Intrastate
143 - Miles City Intrastate
144 - Missoula Intrastate

The three digit number in the above listing has been assigned by EPA as a part of a nationwide numbering system for all AQCRs. Figure A-1 shows the boundaries of Montana's AQCRs, and outlines the State's counties. None of the AQCRs have boundaries which cross state lines.

Tables A-1, A-2 and A-3 summarize additional general information which characterizes Montana's air quality, and provides other parameters concerning the AQCRs. In Table A-1 the following information is presented:

1) Priority classifications for the pollutants under study.

2) Demographic data

3) Counties within the State which have been designated Air Quality Maintenance Areas (AQMA).

Priority classifications give an indication of the extent to which certain pollutants pose air quality problems for the AQCR. A Priority I listing indicates that relatively high ambient concentrations have been either observed, estimated (in the absence of adequate measured air quality data), or predicted (due to the expected presence of future sources). In those Priority I areas where the air quality reflects emissions predominantly from a single point source, the I-A classification is used. A Priority III designation is used when pollutant concentrations are generally lower than NAAQS. A Priority II designation indicates intermediate pollutant levels.

With respect to the pollutants under study, Table A-1 indicates the existence of air quality problems in the Helena AQCR since it is classified I-A for both particulates and SO_2. The only other AQCRs where potentially serious problems are indicated are the Great Falls AQCR (141) which is classified I-A for SO_2, and the Missoula AQCR (144) which is designated Priority I for particulates.

AQMA designations are a way of identifying those areas in the state which, due to current air quality and/or projected growth rate, may have the potential for exceeding any national standard within the ten year period 1975-1985. These designations are proposed by either the state, or by the Regional EPA Office. As an AQMA, it is likely that more restrictive changes will have to be made to existent regulations and/or air pollution control plans. Montana has acted to formally designate six areas in the State as AQMAs. The counties comprising these designated areas are listed in Table A-1.

Table A-2 presents the dates when the ambient levels of the pollutants under study is expected to be within the limits set by NAAQS. The only AQCR with an attainment date later than the July 1975 date originally prescribed by law is the Helena AQCR. Due to the operation of two smelters, attainment of the primary SO_2 standard in this AQCR was delayed until July 1977. In addition, EPA granted the State an 18-month extension of the statutory time-table for submission of the plan for attainment and maintenance of the secondary standards for sulfur oxides in this AQCR.

A summary of the federal and Montana Air Quality Standards for the pollutants under study is presented in Table A-3. The Montana annual standard for particulates is identical to the Federal Primary Standard, while the level required by the State's 24-hour standard is midway between the Federal Primary and Secondary Standards. The Montana Air Quality Standards for SO_2 are more stringent than the federal SO_2 standards. Montana does not have an NO_2 standard.

As shown on Table A-4, the Montana Monitoring Network for suspended particulate matter consists of 35 stations. There are at least four monitoring sites in each Montana AQCR. Ambient monitoring of SO_2 is limited within the State. According to 1973 National Aerometric Data Bank (NADB) information, Montana has a total of 10 SO_2 monitoring sites. Seven of these sites use the bubbler method of analysis (West-Gaeke sulfamic acid 24-hour bubbler), while the remaining three sites use the continuous (coulometric) method of analysis. None of the State's monitoring sites have both types of equipment.

Tables A-4 and A-5 also present summaries of Montana's particulate and SO_2 air quality status for the year 1973. These summaries include highest and second highest recordings, number of stations exceeding NAAQS, and the emission reductions required to meet federal ambient air quality standards. Table A-4 shows particulate NAAQS violations in all except the Great Falls AQCR (141). Three of the monitors in this AQCR recorded TSP levels which exceeded the national secondary standard, but since only one excess was measured at each of three stations, no NAAQS TSP violation was recorded. (Violations are based on more than one excess at each station.) Based on existing monitoring, only the Helena AQCR (142) showed a violation of NAAQS SO_2 standards.

Table A-6 provides a tabulation of power plants and fuel burning point sources that produce particulate and SO_2 emissions. The information obtained from the National Emission Data System (NEDS) and Federal Power Commission (FPC) show agreement. However, recent information from the EPA Regional Office indicates additional power plants in the State. These additional facilities include plants which are small (less than 10 megawatts electric) and also diesel powered plants. The three plants identified by the NEDS and FPC listings comprise the State's major power plants and for that reason are the ones of most interest for the purposes of this review.

2.3 BACKGROUND OF THE DEVELOPMENT OF THE CURRENT STATE IMPLEMENTATION PLAN

The State Implementation Plan control strategies and regulations were based on a statewide approach. Demonstration of the attainment of the particulate standards was done on a region-by-region basis. The control strategies and regulations as submitted by the State were adequate to attain NAAQS for particulates in Montana.

The State did not include a discussion of its control strategy for sulfur oxides in the submitted plan, however Montana does have a regulation controlling the sulfur content of solid, liquid and gaseous fuels. EPA evaluated the adequacy of this regulation for achievement of NAAQS in all AQCRs. Except for the Helena AQCR, this regulation was found adequate to achieve NAAQS for SO_2 in the State of Montana.

The attainment and maintenance of all national standards for SO_2 could not be demonstrated by applying this regulation to sources in the Helena AQCR. There are two significant sources for sulfur oxides in this AQCR: the first is a lead smelter in East Helena and the second is a copper smelter in Anaconda. The Environmental Protection Agency used a diffusion model and ambient air quality monitoring to determine that more than reasonably available control technology would be required for the Anaconda smelter to reduce emissions enough to attain and maintain the primary SO_2 standard by 1975. It was on the basis of this finding that EPA granted the two year and 18-month extensions mentioned in the previous section. Adequate sulfur oxides control regulations applicable to non-ferrous smelters were not included in the SIP; however, both EPA and the State are developing such regulations.

Montana's fuel combustion source emission control regulations are summarized in Table A-10. The regulation for the control of particulate matter uses a sliding scale format and the maximum level of allowable emissions is stated in terms of pounds of particulate matter per million Btu heat input. Differing limits apply to new and existing sources.

The State regulation to control SO_2 from fuel combustion sources places limits on the sulfur content of fuels used in these sources. This regulation is applicable to new, existing and modified sources in the State of Montana.

2.4 SPECIAL CONSIDERATIONS FOR THE STATE OF MONTANA

A total of 16 counties and one Indian reservation have been designated by the State as AQMAs for TSP, and 14 counties and one Indian reservation have been designated as AQMAs for SO_2 (see Table A-1). Thus, it is probable that more strict changes will have to be made to existing regulations and/or air pollution control plans in these areas.

2.5 ENERGY SUPPLY POTENTIAL OF MONTANA

Montana has sizeable fossil fuel resources in the form of coal, oil and natural gas. The oil and natural gas deposits are spotted throughout Montana.

Montana has extensive deposits of lignite coal, as well as equally large deposits of sub-bituminous coal along the eastern border of the state. Additional sub-bituminous coal, along with deposits of bituminous coal are found in the mountainous areas of Montana. Some of this potentially strippable coal is slated for a major power plant in Montana. It is also possible that this coal could be used for coal gasification. Montana lignite has been successfully converted to pipeline quality gas using a process developed by the Institute of Gas Technology of the Illinois Institute of Technology in Chicago.

Table E-2 presents fuel production and consumption data for the State of Montana. These statistics show Montana produces more oil and coal than it consumes, but uses more than 2.5 times as much gas as is produced within the State.

3.0 AQCR ASSESSMENTS

3.1 REGIONAL AIR QUALITY ASSESSMENTS

Tables A-7 and A-8 present the emissions summaries for Montana. They indicate a small fraction (29%) of particulates come from fuel combustion sources statewide. Only in the Miles City AQCR (143) are fuel combustion emissions high (77%) compared to total emissions. Fuel combustion sources are minor contributors to SO_2 emissions on a statewide basis (approximately 15%). Again, in the Miles City AQCR, fuel combustion emissions contribute 55% of SO_2 emissions.

Table A-9 presents the results when the proportional model is used to determine the tolerance for emissions increase in each AQCR. The largest drawback of this approach lies in the large geographical dispersion of the emission sources in Montana. Therefore, this analysis is intended to give an "indication" of potential areas for regulation relaxation.

Retrievals of 1973 air quality data from the NADB did not include information on SO_2 levels in the Billings (140) and Missoula (144) AQCRs. Therefore, a tolerance for emissions increase cannot be calculated for these areas.

Tables B-1 and B-2 summarize the general data that must be considered when estimating the potential for regulation relaxation. The analysis was performed to determine if any regions were obvious candidates for regulation relaxation. There is no indication from available data that Montana's regulations are too stringent for suspended particulate emissions, and with the exception of the Great Falls AQCR, all regions have been classified as poor candidates for particulate regulation relaxation. In the Great Falls AQCR, the air quality control measurement value is identical to the secondary standard, therefore, the tolerance for emissions increase is zero. However, since it is conceivable that particulate emissions from fuel burning sources in this AQCR could be increased if controls on other sectors achieved an overall decrease in emissions, it seemed appropriate for the Great Falls AQCR to be classified as a marginal candidate.

There is potential for the relaxation of SO_2 fuel combustion emission regulations in the Great Falls and Miles City AQCRs, however, this is not indicated in the Helena AQCR. Because of insufficient SO_2 air quality data in the Billings and Missoula AQCRs, they have been classified as marginal candidates.

Based on 1973 air quality and emissions data, the Helena AQCR (142) exhibits NAAQS violations for SO_2, therefore, any increase in SO_2 emissions in this AQCR would tend to aggravate this situation. However, as shown in Table A-6, and in Appendices C and D, there are no major SO_2 emitting stationary fuel combustion sources in this AQCR.

3.2. POWER PLANT ASSESSMENTS

In the context of the fuel switches being considered, information available for this review shows three major power plants in the State of Montana. Other power plants in the state are either too small (less than 10 megawatts electric (Mwe)), or they use diesel power which is outside the purview of this review. Two of the three major plants are in the Billings AQCR (140), while the remaining one is in Miles City (143). Table C-1 provides a listing of the power plants in the State along with a general description of each plant's emission characteristics.

Federal Power Commission fuel schedules for 1973 show Montana's major power plants use a variety of fuels. The J. Corette Power Plant has the State's largest steam power generating capacity (172 Mwe), and is located in the city of Billings. This plant, and also a smaller plant (Lewis and Clark) located in the city of Sidney, have coal as their principal fuel, with gas making a small contribution to the overall heat input. The State's third power plant (the Frank Bird facility located in Billings) uses mostly oil, but also substantial quantities of gas.

Also shown in Table C-1 is a listing of the existing and allowable emission rates for the State's steam generating power plants. The allowables were based on the applicable state regulation. For particulates, an equation was dervied which corresponds to the graph shown in Figure A-2.

This equation is shown below:

$$E = 0.9I^{-0.17609}$$

where

E = the maximum particulate emission level in pounds of particulate matter per million Btu

I = total heat input in millions of Btu per hour

This equation was used to compute the allowable particulate emission rate for the fuel combustion sources discussed in this review. The allowable rate was based on the total heat input to a facility. A comparison of the existing and allowable emission rates show that Montana's three major power plants are generally operating within the limits of the State's emission regulations. Only the Lewis & Clark station shows a violation of Montana's particulate regulation.

The fact that coal already provides most of the heat input to the State's power plants lessens the chance that substantial clean fuel savings could be achieved by additional switches to this fuel.

Table C-2 lists all known projected power plants (1974-1985). This is a coal fired power plant that is scheduled to go on line in stages from 1975 through 1980.

Table C-3 is a summary of power generation emission factors (AP-42) and average fuel heat contents used in this review.

3.3 INDUSTRIAL/COMMERCIAL/INSTITUTIONAL SOURCE ASSESSMENTS

Emission and fuel use characteristics of all major stationary fuel combustion sources (other than power plants) in the State of Montana identified by NEDS listings are presented in Table D-1. One of those sources presently uses 100% coal, the remaining sources use 100% wood, oil, or gas. None use a combination of fuel sources. It is also not known to what extent industrial sources using gas can effectively switch to coal.

The combustion of wood by the State's industrial sources is included in Appendix D because it represents a significant contribution to the State's overall heat input budget (qual to one half of the heat input provided by coal), and it also can be a substantial source of particulate emissions.

3.4 AREA SOURCE ASSESSMENT

The state of Montana was found to have no area sources which could be evaluated within the context of Section 4 of ESECA.

3.5 STATIONARY SOURCE FUEL SUMMARY

Table E-1 presents a summary of stationary source fuel use within the State. This information reflects data in the NEDS files as of December 6, 1974. On a statewide basis, natural gas is obviously the most important fuel, providing 62% of the heat input supplied to the State's stationary source fuel combustion sources. Area sources using natural gas provide the largest contribution to the state's heat input budget. Even among the State's point sources, natural gas provides more heat input than any of the other fuels. However, much of this gas is utilized by the State's industrial sector, and it is not known to what extent these sources can switch to other (dirtier) fuels.

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APPENDIX A

- State implementation plan information
- Current air quality information
- Current emissions information

Tables in this appendix summarize original and modified state implementation plan information, including original priority classifications, attainment dates, ambient air quality standards, and fuel combustion emission regulations. National Aerometric Data Bank data for SO_2 and TSP monitoring stations are shown for AQCRs in the State. National Emission Data System information by AQCR[1] are tabulated and broken down into fuel burning categories.

An emission tolerance, or emission tonnage which might be allowed in the AQCR and still not violate national secondary ambient air quality standards, is shown for particulates and SO_2 in Table A-9. The intent of this calculation is to indicate possible candidate regions for fuel switching. Tolerance was based on air quality/emissions relationships which are calculated from more recent data. The value of the emissions tolerance provides an indication of the potential an AQCR possesses for fuel switching and regulation relaxation.

When current air quality levels were less than one half of the level represented by an ambient air quality standard, no "rollup" emissions tolerance was calculated in Table A-9. This arbitrary cutoff point was chosen so as not to distort the emissions tolerance for an area. At low levels of a pollutant, the relationship between emissions and air quality is probably not linear. Although this cutoff may leave some AQCRs with no quantifiable emissions tolerance, it was felt that no number at all would be preferable to a bad or misleading number.

[1] "1972 National Emissions Report," EPA-450/2-012, June 1974.

It is emphasized that emissions tolerance is a region-wide calculation. This tolerance obviously makes more sense in, say, an urban AQCR with many closely spaced emission sources than in a largely rural AQCR with geographically dispersed emissions.

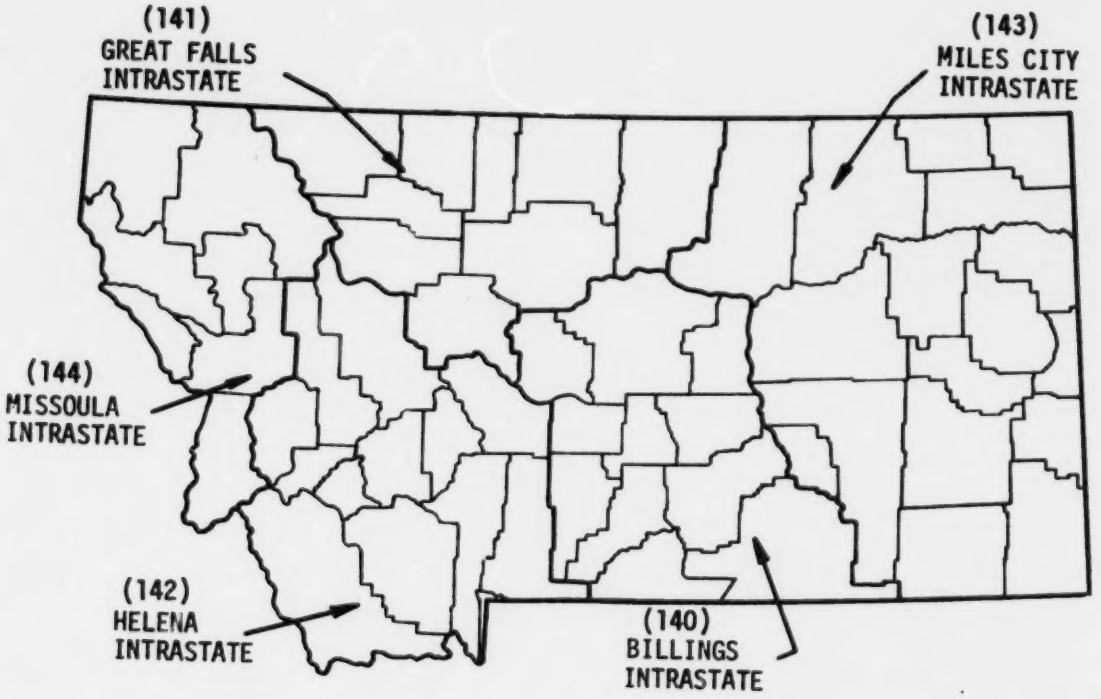

Figure A-1. Air Quality Control Regions in Montana

Table A-1 AQCR Priority Classification and AQMAs, Montana

AQCR	Fed. #	Part.[a]	SO_x[b]	NO_x[c]	Demographic Information			AQMA Designations[d,e]		
					Population 1970	Square Miles	Population Density	TSP Counties	SO_x Counties	NO_x Counties
Billings	140	II	II	III	135,263	25,625	5.28	Big Horn[f] Carbon Stillwater Sweet Grass Yellowstone	Big Horn[f] Carbon Stillwater Sweet Grass Yellowstone	None
Great Falls	141	III	I-A	III	144,070	24,062	5.98	None	None	None
Helena	142	I-A	I-A	III	167,100	28,430	5.88	Deer Lodge Silver Bow	Deer Lodge Silver Bow Lewis & Clark	None
Miles City	143	III	III	III	93,221	47,852	1.95	Carter Custer Fallon Powder River Rosebud Treasure N. Cheyenne Indian Res.	Carter Custer Fallon Powder River Rosebud Treasure N. Cheyenne Indian Res.	None
Missoula	144	I	III	III	154,691	19,339	8.0	Flathead Lake Missoula	None	None

Legend Follows

Table A-1. AQCR Priority Classification and AQMAs, Montana (Continued)

Criteria Based on Maximum Measured (or Estimated) Pollution Concentration In Area (Expressed as ug/m^3)

Priority	I Greater Than	II From - To	III Less Than
[a]Particulate matter			
Annual geometric mean	95	60 - 90	60
24-hour maximum	325	150 - 325	150
[b]Sulfur oxide:			
Annual arithmetic mean	100	60 - 100	60
24-hour maximum	455	260 - 455	260
[c]Nitrogen dioxide	110		110

[d]Federal Register, August 1974, SMSA's showing potential for NAAQS violations due to growth.

[e]As developed by the State of Montana and submitted to the Regional EPA Administrator on January 24, 1975.

[f]Excluding the Northern Cheyenne Indian Reservation

Table A-2. Attainment Dates - Montana

AQCR	AQCR Name	Particulates		Sulfur Dioxide		Nitrogen Oxides
		Attainment Dates		Attainment Dates		Attainment Dates
		Primary	Secondary	Primary	Secondary	
140	Billings	7/75	7/75	a	7/75	a
141	Great Falls	a	a	7/75	7/75	a
142	Helena	7/75	7/75	7/77	b	a
143	Miles City	a	a	a	a	a
144	Missoula	7/75	7/75	a	a	a

[a]Air quality presently below standards.

[b]EPA granted an 18-month extension of the statutory timetable for submission of the plan for attainment and maintenance of the secondary standards for sulfur oxides in this AQCR.

Table A-3. Ambient Air Quality Standards - Montana (Expressed as ug/m^3)

		Total Suspended Particulate		Sulfur Oxides				Nitrogen Dioxide
		Annual	24-Hr.	Annual	24-Hr.	3 Hr.	1 Hr.	Annual
Federal[1] (Nov. 1972)	Primary	75(G)	260[a]	80(A)	365[a]	---	---	100(A)
	Secondary	60(G)[b]	150[a]	---	---	1300[a]	---	100(A)
State		75(G)	200[c]	60(A)	260[d]	---	650[e]	---

[1]Federal regulations apply

(G) Geometric Mean

(A) Arithmetic Mean

[a]Not to be exceeded more than once per year

[b]This level is not a formalized standard but is rather meant to be used in SIPs as a guide to help in the attainment of the 24-hr standard. See FR, September 14, 1973 for additional details.

[c]Not to be exceeded more than one percent of days a year.

[d]Not to be exceeded more than one percent of days in any three month period.

[e]Not to be exceeded more than one hour in any four consecutive days.

Table A-4. Montana AQCR Air Quality Status (1973), TSP[a]

AQCR Name	AQCR #	# Stations Reporting	TSP Concentration (ug/m^3) Highest Reading		2ND Highest Reading 24-HR.	# Stations Exceeding Ambient Air Quality Standards						% Reduction Required To Meet National Standards	Standard On Which Reduction Is Based
						Primary		Secondary					
			Annual	24-Hr.		Annual	24-Hr.[b]	Annual	%	24-Hr[b]	%		
Billings	140	8	78[d]	180	158	e	0	e	-	0	-	37.5	Annual
Great Falls	141	4	18	204	150	0	0	0	0	3	75	0	24-Hr.
Helena	142	4	73[d]	200	195	0	0	0	0	2	50	30.2	Annual
Miles City	143	7	87[d]	394	357	0	1	0	0	1	14	58.0	24-Hr.
Missoula	144	12	118[d]	592	512	0	2	0	17	6	50	70.7	24-Hr.

[a] 1973 air quality in National Air Data Bank as of July 26, 1974.

[b] Violations based on more than one reading in excess of standards.

[c] Formula: $\frac{\text{2nd highest 24 hr} - \text{24 hr Secondary Standard}}{\text{2nd highest 24 hr}} \times 100$, $\frac{\text{Annual} - \text{Annual Secondary Standard}}{\text{Annual} - \text{background}}$

[d] The values listed here were provided by EPA Region VIII. The 1973 air quality information retrieved from the National Aerometric Data Bank (NADB) did not provide annual values for this AQCR.

[e] SAROAD data for 1973 did not include this information. However, the annual air quality data provided by the EPA Region VIII office shown in this Table indicates that there was at least one station which exceeded the secondary standard. A TSP background of 30 ug/m^3 (as used in the SIP) was used in calculations of the reductions based on annual readings.

Table A-5. Montana AQCR Air Quality Status (1973) SO_2[a]

AQCR NAME	AQCR #	# Stations Reporting 24-Hr (Bubbler)	# Stations Reporting (Contin.)	SO_2 Concentration ug/m^3 Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Stds. Primary Annual	Primary 24-Hr[b]	Secondary 3-Hr	% Reduction[c] Required To Meet Standards	Standard On Which % Reduction Is Based
Billings	140	NDA	0	NDA	--	--	NDA	--	--	--	--
Great Falls	141	1	NDA	NDA	10	10	NDA	NDA	NDA	Presently Meets Standards	Primary 24-Hr. Standard
Helena	142	6	2	NDA	882	565	NDA	5	0	35.4	Primary 24-Hr. Standard
Miles City	143	NDA	1	NDA	13	--	NDA	0	0	Presently Meets Standards	Primary 24-Hr. Standard
Missoula	144	NDA	NDA	NDA	--	--	NDA	--	--	--	--

[a]1973 air quality in National Air Data Bank as of July 28, 1974

[b]Violations based on more than one reading in excess of standards

[c]Formula: $\frac{\text{2nd highest 24 hr - Primary 24 hr standard}}{\text{2nd highest 24 hr}} \times 100$

NDA - No Data Available

Table A-6 Fuel Combustion Source Summary-Montana

		Power Plants		Other Fuel Combustion Point Sources[a]	
AQCR NAME	AQCR #	NEDS[a]	FPC[b]	Particulate	SO_2
Billings	140	2	2	4	3
Great Falls	141	0	0	1	0
Helena	142	0	0	7	0
Miles City	143	1[c]	1	2	2
Missoula	144	0[d]	0	10	10

[a]All sources from National Emissions Data System Listing as of December 6, 1974.

[b]Federal Power Commission information for 1973 of major power plants as retrieved from EPA data banks.

[c]More recent information received from the EPA Regional Office shows three power plants in this AQCR.

[d]More recent information received from the EPA Regional Office shows one power plant in this AQCR.

Table A-7 Montana Emissions Summary, SO_2 (10^3 tons/yr)[a]

AQCR		Total 10^3 Tons/Yr	Percent Fuel Combustion[b]	Electricity Generation		Point Source Fuel Combustion		Area Source Fuel Combustion	
				10^3 Tons/Yr	%[b]	10^3 Tons/Yr	%[b]	10^3 Tons/Yr	%[b]
Billings	140	633	1.5	4.7	0.74	3.4	0.54	1.7	0.27
Great Falls	141	5.4	25.9	0	0	0	0	1.4	25.90
Helena	142	306	0.5	0	0	0	0	1.7	0.55
Miles City	143	7.3	77.3	4.3	58.90	0.24	3.29	1.1	15.10
Missoula	144	6.9	39.0	0	0	0.69	10.00	2.0	29.00

[a]Based on NEDS 1972 National Emissions Report.

[b]Represents the percent of the year's total SO_2 emissions.

[c]NEDS data shows one ton per year.

Table A-8. Montana Emissions Summary, TSP (10^3 tons/yr)[a]

AQCR		Total	Percent Fuel Combustion[b]	Electricity Generation		Point Source Fuel Combustion		Area Source Fuel Combustion	
		10^3 Tons/Yr		10^3 Tons/Yr	%[b]	10^3 Tons/Yr	%[b]	10^3 Tons/Yr	%[b]
Billings	140	220	1.4	0.75	0.34	1.80	0.82	0.56	0.25
Great Falls	141	3.9	10.3	0	0	0[c]	0	0.40	10.30
Helena	142	33.4	2.3	0	0	0.09	0.27	0.67	2.00
Miles City	143	6.5	54.7	3.20	49.20	0.04	0.62	0.32	4.90
Missoula	144	37.1	7.3	0	0	1.90	5.10	0.80	2.20

[a]Based on NEDS 1972 National Emissions Report.

[b]Represents the percent of the year's total particulate emissions.

[c]NEDS show 2 tons of emissions per year.

Table A-9. Montana Required Emission Reductions, Particulates, SO_2

AQCR	PARTICULATES					SO_2			
	1973 AQ Measurement Control Value	Percent Reduction Required Based on 1973 AQ Data[d]	1972 NEDS Emissions 10^3 Tons/Yr	Allowable Emissions 10^3 Tons/Yr	Emissions Tolerance 10^3 Tons/Yr	Percent Reduction Required Based on 1973 AQ Data	1972 NEDS Emissions 10^3 Tons/Yr	Allowable Emissions 10^3 Tons/Yr	Emissions Tolerance 10^3 Tons/Yr
Billings	78[b]	37.5	220	137.5	-82.5	NDA	633	----	----
Great Falls	150[c]	0	3.9	3.9	0	Meets Stds.	5.4	NC[a]	a
Helena	73[b]	30.2	33.4	23.3	-10.1	35.4	308	199.0	-109.0
Miles City	357[c]	58.0	6.5	3.4	-3.1	Meets Stds.	7.3	NC[a]	a
Missoula	512[c]	70.7	18.1	12.7	-24.4	NDA	6.9	----	----

[a]Available air quality data indicates that there is a potential for allowing substantial increases of the emissions of sulfur oxides in this region. However, if the proportional model is used to quantify this increase, unrealistically high values would result. Therefore, no calculation was made.

[b]Data provided by EPA, Region VIII, annual geometric means.

[c]1973 air quality data in National Aerometric Data Bank as of July 28, 1974, 24-hour readings.

[d]Background of 30 $\mu g/m^3$ used in the SIP, repeated here for consistency.

NC - Not calculated

NDA - No data available

Table A-10. Summary of Montana Regulations Concerning Fuel Combustion

Particulate Emissions		
	Maximum Allowable Emissions of Particulate Matter in Pounds Per Million Btu	
Heat Input in Million Btu/hr *	Existing Equipment (lbs/hr)	New Equipment (lbs/hr)
Up to and including 10	0.60	0.60
100	0.40	0.35
1,000	0.28	0.20
10,000 and above	0.19	0.12

*For heat inputs not listed, see Figure A-2 for allowable emissions.

Regulation of sulfur in fuel:

Gaseous Fuel: Commencing July 1, 1971, no person shall burn any gaseous fuel containing sulfur compounds in excess of 50 grains per 100 cubic feet of gaseous fuel, calculated as hydrogen sulfide at standard conditions.

Liquid or Solid Fuel: Commencing July 1, 1972, no person shall burn liquid or solid fuels containing sulfur in excess of one (1) pound of sulfur per million Btu fired.

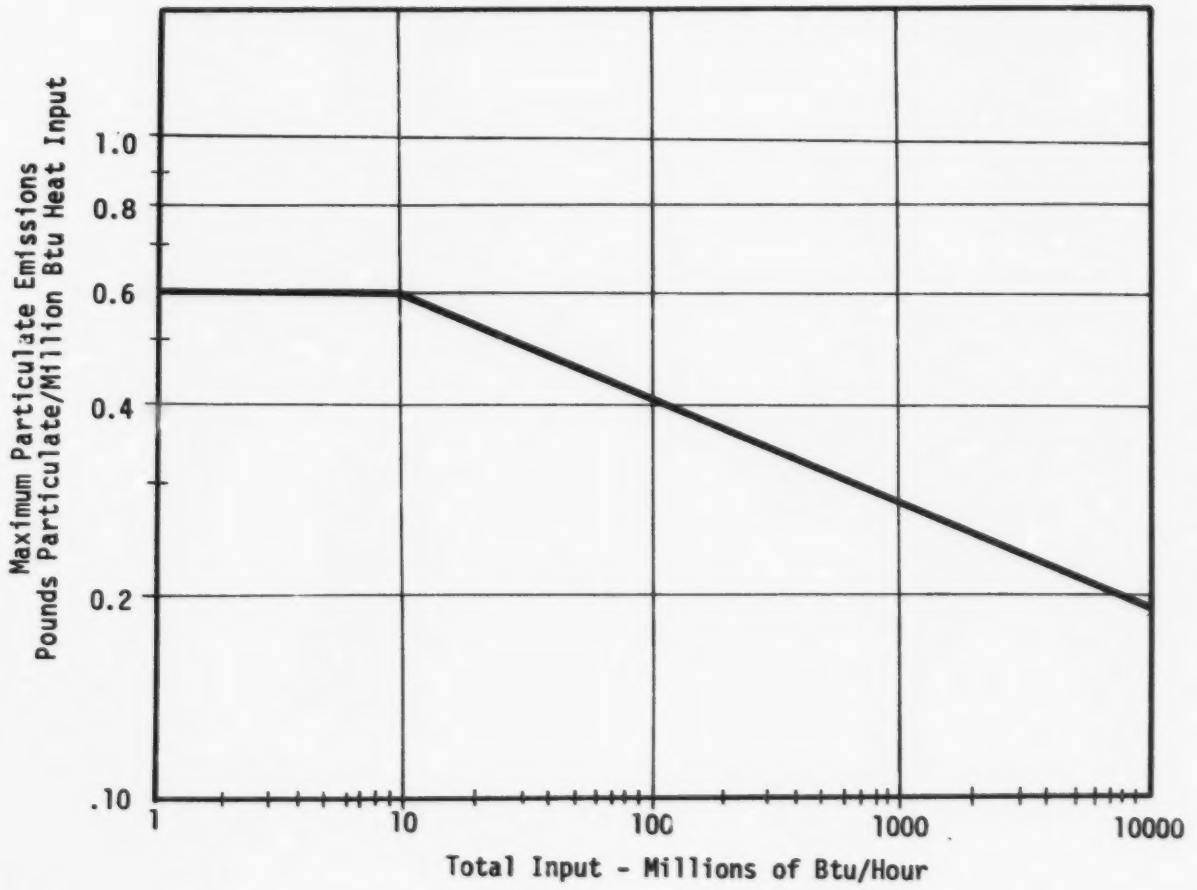

Figure A-2. Maximum Emission of Particulate Matter for Existing Fuel Burning Installations

APPENDIX B

Tables B-1 and B-2 are the assessment of AQCRs which should be examined for the fuel switching impact on particulate and SO_2 emissions. They also provide an identification of those AQCRs which show little potential for fuel revision or regulation relaxation if ambient air standards are to be attained.

The criteria for candidates are (1) the severity and breadth of air quality violations, (2) the tolerance for emissions increased in the AQCR, (3) the fraction of total emissions resulting from fuel combustion, and (4) AQMA designations. It should be noted that an AQCR may not necessarily need relaxation of regulations in order to accomplish fuel switching. Further, a good candidate in Table B-1 and B-2 may later show little potential for fuel switching after individual sources are examined. Finally it is possible that an AQCR may have air quality levels below standard at present and may require more strict regulation than currently exist if all fuel burning sources were converted to dirtier fuels, i.e., "average" emission rate now may be below "average" regulations.

Table B-1. Montana Candidacy Assessment for Relaxation of Particulate Regulations

AQCR	# of Stations	# of Stations Reporting Violations of National Secondary Standards		Expected Attainment Dates[a]	Counties With AQMA Designations for Particulates	1972 Total Emissions	% Emissions From Fuel Combustion	1972 Emissions From Fuel Combustion	Tolerance for Emissions Increase	Regionwide Evaluation
		ANNUAL	24 HR	Secondary Standards		10^3 Tons/Yr		10^3 Tons/Yr	10^3 Tons/Yr	
Billings 140	8	-	1	7/75	5[b]	220	1.4	3.10	-82.5	Poor
Great Falls 141	4	0	0	a	0	3.9	10.3	0.40	0	Marginal
Helena 142	4	0	1	7/75	2	33.4	2.3	0.77	-10.1	Poor
Miles City 143	7	0	1	a	6[c]	6.5	54.7	3.60	- 3.1	Poor
Missoula	12	0	5	7/75	3	37.1	7.3	2.70	-24.4	Poor

[a]When the attainment dates were formalized, air quality in this region was better than standards require.

[b]Excluding the Northern Cheyenne Indian Reservation.

[c]Plus the Northern Cheyenne Indian Reservation.

Table B-2 Candidacy Assessment for Relaxation of SO_2 Regulations in Montana

AQCR	# of Stations		# of Stations Reporting Violations of National Standards			Expected Attainment Date	Counties With AQMA Designations for SO_2	1972 Total Emissions	% Emissions From Fuel Combustion	1972 Emissions From Fuel Combustion	% Tolerance for Emissions Increase	Regionwide Evaluation
	Bubbler	Continuous	Annual	24 Hr	3 Hr	Secondary Standards		10^3 Tons/Yr		10^3 Tons/Yr	10^3 Tons/Yr	
Billings 140	NDA[b]	NDA[b]	-	-	-	7/75	5[g]	633	1.5	9.5	-	Marginal
Great Falls 141	1	NDA[c]	NDA[d]	0	-	7/75	0	5.4	25.9	1.4	i	Good
Helena 142	0	2	NDA[d]	3[e]	0	f	3	308	0.5	1.5	-109.0	Poor
Miles City 143	NDA[c]	1	-	0	0	a	6[h]	7.3	77.3	5.6	i	Good
Missoula 144	NDA[b]	NDA[b]	-	-	-	a	0	6.9	39.0	2.7	-	Marginal

[a] When attainment dates were formalized, air quality was better than standards require.

[b] Based on information retrieved from the National Aerometric Data Bank, there was no 1973 SO_2 air quality data for these AQCRs.

[c] Data from the National Aerometric Data Bank did not include information for this particular type of monitor located in this AQCR.

[d] Data from the National Aerometric Data Bank did not include annual SO_2 air quality information for this AQCR.

[e] Two violations were recorded at bubble monitors, and one violation at a continuous monitor. All 3 monitors were at different sites.

[f] EPA granted Montana an 18 month extension of the statutory timetable for submission of the plan for attainment and maintenance of the secondary standards for sulfur oxides in this AQCR.

[g] Excluding the Northern Cheyenne Indian Reservation.

[h] Plus the Northern Cheyenne Indian Reservation

[i] Available air quality indicates there is a potential for allowing substantial increases of the particulate emissions in this region. However, if the proportional model is used to quanitfy this increase, an unrealistically high value would result. Therefore, no calculation was made.

APPENDIX C

This section is a review of individual power plants by AQCR. The intent is to illustrate fuel switching possibilities and particulate and SO_2 emissions resulting from these switches on an individual plant basis. The total AQCR emissions resulting from such switches is then calculated.

Current power plant information used to prepare Table C-1 were obtained from three main sources: (1) Federal Power Commission computerized listings of power plants and their associated fuel use, (2) the National Coal Association "Steam Tables" listing of power plants and fuel use in 1972, and (3) NEDS Emissions data.[1] For those plants listed by the FPC (1 above), the 1973 fuel schedule was assumed, otherwise, fuel use is for 1972. Heat inputs are those based on actual fuel values where known, and average values shown in Table C-3 were used where not known. SO_2 and particulates emissions are those associated with the fuel use shown. In the case of particulates, emissions were calculated using NEDS emissions factors applied to the listed fuel schedule. When a plant was not listed in NEDS, AP-42 emission factors were used to estimate SO_2 and TSP emissions (see Table C-3).

Table C-1. Montana Power Plan Fuel Combustion Point Source Characterization (1973)

AQCR	Plant Location (Plant Name) Size, and Fuel Design	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual* Quantity	Fuel Use: Heat Input (10^6 Btu/Hr)	Emissions: SO_2 Existing Tons/Yr	Emissions: SO_2 Existing Lbs/10^6 Btu	Emissions: SO_2 Allowable Emissions (Based On Regulations Limits) Tons/Yr	Emissions: SO_2 Allowable Emissions (Based On Regulations Limits) Lbs/10^6 Btu	Emissions: TSP Existing Tons/Yr	Emissions: TSP Existing Lbs/10^6 Btu	Emissions: TSP Allowable Emissions (Based On Regulations Limits) Tons/Yr	Emissions: TSP Allowable Emissions (Based On Regulations Limits) Lbs/10^6 Btu
140	Billings (Corette) 172 MW Coal Gas	Coal 0.7 Sulfur 8% Ash	576	1130	7610	1.5	10100	2.0	1230	0.23	1500	.26
		Gas	433	50	-	-			-			
				1180	7610	1.5						
140	Billings (Bird) 70 MW Oil Gas	Oil 1.4% S	233	155	1025	1.19	1700	2.0	39	.04	400	.35
		Gas	401	42	-	-			-			
				197	1025	1.19						
143	Sidney (Lewis & Clark) 50 MW Coal Gas	Coal .55% S	306	453	3260	1.62	4080	2.0	3060(Est)	1.52	620	0.31
		Gas	44	5	-	-			-			
				458	3260	1.60						

*Totals:
Coal 882×10^3 tons
Oil 233×10^3 barrels
Gas 878×10^6 cu. ft.

Table C-2. Montana Power Plant Projected Development

AQCR/Number/County	Owner	Plant[a]	MW	Projected Emissions NSPS (tons/year)		
				Particulates	SO_2	NO_x
Miles City/143/Rosebud	Montana Power	Colstrip #1 7/75	350	1239	14,882	8,680
		Colstrip #2 7/76	350	1239	14,882	8,680
		Colstrip #3 7/80	700	2478	29,764	17,360
		Colstrip #4 7/79	700	2478	29,764	17,360

[b] Coal use in 1975 = 340 x 10^3 tons
Coal use in 1977 = 1780 x 10^3 tons
Coal use in 1980 = 5545 x 10^3 tons

[a] Coal fired plants; dates refer to expected start-up times.

[b] Expected use of coal at the Colstrip facilities in the years indicated.

Table C-3 AP-42 Power Generation Emission Factors

Fuel	Particulates		SO_2		Hydrocarbons		NO_x (as NO_2)	
	Lbs/Ton	Lbs/10^6 Btu	Lbs/Ton	Lbs/10^6 Btu	Lbs/Ton	Lbs/10^6 Btu	Lbs/Ton	Lbs/10^6 Btu
Coal(1) (Bit.)								
General	160	7.4			0.3	0.013	18	0.78
wetbottom 10%A	130	7.0					30	1.30
Cyclone	20	0.9					55	2.40
1% S	Same	Same	38	1.65	0.3	0.013	Same	Same
2% S	as	as	76	3.30			as	as
3% S	Above	Above	114	5.00			Above	Above
Oil(2)	Lb/10^3 Gal		Lb/10^3 Gal		Lb/10^3 Gal		Lb/10^3 Gal	
0.5% S	8	0.058	79	0.560	2	.014	105	0.75
1.0% S	8	.058	157	1.12	2	.014	105	0.75
2.0% S	8	.058	314	2.24	2	.014	105	0.75
Gas(3)	Lb/10^6 Ft^3		Lb/10^6 Ft^3		Lb/10^6 Ft^3		Lb/10^6 Ft^3	
(.3 lbs S/ $10^6 ft^3$)	15	.015	0.57	.00057	1	.001	600	0.60

(1) Coal 23 x 10^6 Btu/Ton
(2) Oil 140 x 10^3 Btu/Gal
(3) Gas 1000 Btu/ft^3

APPENDIX D

The Tables D-1 in this appendix list individual industrial/commercial/institutional sources of particulates and SO_2 emissions which might show fuel switching potential. The sources are from NEDS point source listings retrieved from EPA data banks in December 1974. All fuel combustion sources included in this data are listed in Table D-1, however, this Table does not purport to comprehensively list all of Montana's industrial sources.

Table D-1 Montana Industrial-Commercial Fuel Combustion Point Source Characterization

County & AQCR	Plant Name	Fuel Use			Emissions					
					SO_2			TSP		
		Type Sulfur % Ash	Annual[1] Quantity	Heat[2] Input (10^6Btu/Hr)	Existing Tons/Yr	Existing lbs/10^6 Btu	Allowable Emissions (Based On Regulat'ns Limits) lbs/10^6 Btu	Existing Tons/Yr	Existing lbs/10^6 Btu	Allowable Emissions (Based on Regulations Limits) lbs/10^6Btu
Big Horn 140	Holly Sugar	Coal 0.09 S 8.7 A	27	32	47	0.21	2.0	1540	6.80	0.45
Fergus 140	U.S. Gypsum	Gas	140	16.9	1	0.01	N/A[3]	1	0.01	0.55
Yellowstone 140	Great Western Sugar	Gas	1535	175	< 1	-	N/A[3]	14	0.02	0.36
Yellowstone 140	Continental Oil	Gas Oil 0.34 S	4950 180	565 120	1 201	0.07	N/A[3] 2.0	45 67	0.04	0.29
Yellowstone 140	Pers. Union Cntl. Ex.	Gas Oil 4.5 S	880 248	100 164	1 3174	2.70	N/A[3] 2.0	12 120	0.11	0.34
Yellowstone 140	Montana Sulfur	Gas	8	0.9	< 1	-	N/A[3]	< 1	-	0.60
Cascade 141	Phillips Petroleum	Gas	230	26.3	1	.01	N/A[3]	2	0.02	0.51
Beaverhead 142	Pfizer	Gas	114	13.0	< 1	-	N/A[3]	< 1	-	0.57
Gallatin 142	Ideal Cement Co.	Gas	2000	228	< 1	-	N/A[3]	18	0.02	0.35
Gallatin 142	United Sierra Talc	Gas	205	23.4	1	.01	N/A[3]	2	0.02	0.52
Powell 142	Rocky Mt. Phosphate	Gas	171	19.5	< 1	-	N/A[3]	2	0.02	0.53
Silver Bow 142	Anaconda	Gas Oil	662 184	75.6 122	1 NDA	-	N/A[3] 2.0	6 58	0.07	0.35
Silver Bow 142	Stauffer Chem.	Gas	450	51.4	< 1	<0.01	N/A[3]	4	0.02	0.45
Powder River 143	Bell Creek Gasoline	Gas	717	81.8	1	<0.01	N/A[3]	6	0.02	0.41
Richland 143	Holly Sugar	Gas	1734	198	1	<0.01	N/A[3]	15	0.02	0.35

Table D-1. Montana Industrial-Commercial Fuel Combustion Point Source Characterization (Continued)

County & AQCR	Plant Name	Fuel Use			Emissions					
					SO_2			TSP		
		Type % Sulfur % Ash	Annual[1] Quantity	Heat[2] Input (10^6Btu/Hr)	Existing Tons/Yr	Existing Lbs/10^6 Btu	Allowable Emissions (Based On Regulat'ns Limits) Lbs/10^6 Btu[3]	Existing Tons/Yr	Existing lbs/10^6 Btu	Allowable Emissions (Based On Regulat'ns Limits) Lbs/10^6Btu
Roosevelt 143	Spruce Oil Corp.	Gas Oil	63 0.57	7.19 0.38	1 1	0.06	N/A[3] 2.0	1 <1	0.03	0.60
Valley 143	AVCO Economic Sys.	Oil 2.0% S	35.7	23.80	236	2.30	2.0	18	0.17	0.52
Lake 144	Dupuis Bros. Lumber Co.	Wood	10.6	17.30	8	0.11	2.0	74	0.99	0.54
Lincoln 144	St. Regis Paper Co.	Wood	368	586	276	0.11	2.0	507	0.20	0.29
Lincoln 144	W.R. Grace Vermiculite	Oil 2.7% S	25.7	17.1	229	3.10	2.0	12	0.16	0.55
Missoula 144	Anaconda Forest Prod.	Wood	96	153	72	0.11	2.0	660	0.98	0.37
Missoula 144	Evans Prod.	Wood	15.1	24.1	11	0.10	2.0	15	0.14	0.51
Missoula 144	Intermountain Lumber	Wood	25	40.0	69	0.39	2.0	113	0.64	0.47
Missoula 144	Hoener Waldorf	Gas Wood	263[1] 52.3	307 83.6	1 39	0.02	N/A[3] 2.0	1 5	<0.01	0.31
Ravalli 144	Intermountain Lumber	Wood	12.4	19.8	9	0.10	2.0	68	0.78	0.53
Sanders 144	Dale Lumber	Wood	30	47.9	23	0.11	2.0	413	1.97	0.46

1. Quantities experessed as follows:
   Coal = 10^3 tons
   Oil = 10^3 bbls
   Gas = 10^6 ft^3
   Wood = 10^3 tons

2. Based on the following average heat contents for the respective fuels:
   1000 Btu/ft^3 for gas
   7000 Btu/lb for gas
   140,000 But/gal for oil
   For coal, the heat content used in calculations correspond to the values included in NEDS Point Source Listing (file created 12/6/74).

3. In these cases, N/A refers to "not available." The regulation covering sulfur in gaseous fuels expresses the limit as a maximum sulfur content in the fuel. NEDS information did not include the sulfur content of natural gas. However, it should be pointed out that if all of the sulfur content of natural gas appeared as SO_2 in the emissions, then the State's emission regulation would correspond to an SO_2 emission limit of 0.14 lbs per million Btu.

APPENDIX E

A summary of Montana fuel use totalized from the NEDS data bank is presented in Table E-1. Table E-2 lists fuel production and consumption figures for Montana (1972).

Table E-1. Montana Stationary Source Fuel Summary

Point Sources	Coal (10^3 tons)	Oil (10^3 bbls.)	Gas (10^6 Ft^3)	Wood (10^3 tons)
Electric Power	668	-	980	-
Industrial	27	670	16,792	610
Commercial/ Institutional		-		-
Area Sources				
Residential	36	853	26,810	50
Industrial	86	1,424	10,540	
Com/Ind	65	554	21,650	-
State Totals	882	3,502	76,772	660
10^{12} Btu/Year*	18	20.6	77	9.0
% of Total Btu	14%	17%	62%	7%

*Calculation of heat inputs is based on the following average heat contents:

Gas - 1000 Btu/Ft^3

Oil - 5.88 x 10^6 Btu/bbl.

Coal - 20 x 10^6 Btu/Ton

Wood - 14 x 10^6 Btu/Ton

Information is obtained from Neds Files as of 12/6/74.

Table E-2. Energy Statistics* for Montana (1972)

Fuel	Production	Consumption
Coal	8.221×10^6 tons	1.3×10^6 tons**
Oil	33.9×10^6 bbl.	22.6×10^6 bbl.
Gas	33.5×10^9 ft^3	85.3×10^9 ft^3

*All oil and gas values are from "Fuel and Energy Data: U.S. by States and Regions," 1972 (U.S. Bureau of Mines). Coal consumption figure obtained from "Assessment of Impact of Air Quality Requirements on Coal in 1975, 1977, and 1980," (U.S. Bureau of Mines).

** Includes Idaho